Link establishment and performance evaluation in IEEE 802.16 wireless mesh networks

Abstract:

Wireless mesh networks (WMNs) are one of the emerging technologies. Their capability for self-organization significantly reduces the complexity of network deployment and maintenance, and thus, requires minimal upfront investment. These networks consist of simple mesh routers and mesh clients, where mesh routers have minimal mobility and form the backbone of WMNs. They provide network access for both mesh and conventional clients. IEEE 802.16 standard (www.ieee 802.org/16) is a recent standard for broadband wireless access networks, which includes a mesh mode operation for distributed channel access of peering nodes. In accordance with the IEEE 802.16 MAC protocol, time is partitioned into frames of fixed duration, each one divided into two sub-frames, for control and data transmission, respectively. Slots in the control sub-frame are used by nodes to negotiate the schedule of transmissions in data sub-frames, and are accessed by means of a collision-free distributed procedure, namely the mesh election procedure. In this paper, we have analyzed the performance of the mesh election procedure by means of simulations, and identify the system configuration parameters that have the most impact on the performance of control message transmission using distributed scheduling algorithm.